METHOD FOR MEASURING SERVICE DATA AMOUNT OF TERMINAL

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a data communication service and, more particularly, to a data communication service using a call connection networking.

2. Description of the Background Art

First- and second-generation mobile communication provides voice-centered service, while the third-generation provides various types of services such as a data service and a multimedia service as well as voice service, for which communication service providers adjust a billing system and a billing reference to the changing service environment.

With the billing system changing, a billing amount of the voice service is calculated depending on service use time, and a billing amount of the data service is calculated depending on a provided data amount (referred to as 'the number of packets', hereinafter).

In general, a radio data service is provided in such manner that information of a network server is directly downloaded to a mobile communication terminal or that information of the network server is downloaded to a terminal equipment (TE) such as a personal computer (PC) or a notebook computer. In the second manner, the mobile communication terminal is simply functioned as a modem.

Figure 1 shows information displayed on a screen of a terminal when a call connection networking is performed in accordance with a conventional art.

As shown in Figure 1, with the conventional mobile communication terminal, only a connection time (or a call time) of a corresponding service is displayed regardless of types of services (e.g., a call service, a data service or a multimedia service).

Figure 2 illustrates a call connection networking procedure using the mobile communication terminal.

As shown in Figure 2, the TE (Terminal Equipment), referring to the personal computer (PC) or a notebook computer, includes a screen easily recognizably by a user and a manipulation-easy device. A mobile terminal (MT) signifies a mobile communication terminal and serves as a modem of the TE.

When the TE intends to download desired information or data from a specific server, it attempts a connection to the MT 20 (step S1).

When the TE 10 and the MT 20 are connected, the TE 10 transfers a data service start request message to the MT 20 (step S2).

Upon receiving the start request message from the TE 10, the MT 20 sets a channel to a packet data serving node (PDSN) 30 or an inter-working function (IWF) (step S3).

As the channel is set, the MT 20 transfers a service activation message to the TE 10. Upon receiving the service activation message, the TE 10 starts uploading and downloading of data from the PDSN 30 (step S4).

When the data transmission is completed and the data service is terminated, the TE 10 transfers a service termination request message to the MT 20.

Then, the MT 20 releases the set channel to the PDSN 30 (step S6) and transfers a non-activation message on the data service to the TE 10.

Upon receiving the data service non-activation message, the TE transfers a connection release request message to the MT 20 to release connection to the MT 20 (step S7).

In case of the voice service, a communication provider calculates duration (that is, a communication channel occupancy time) from the point when the communication channel was set between the MT 20 and the PDSN 30 to the point of releasing of the communication channel, and estimates a billing amount according to the calculated time.

Meanwhile, in the case of the data service, the communication provider calculates the number of packets from the point when the communication channel was set between the MT 20 and the PDSN 30 to the point of releasing of the communication channel, and estimates a billing amount according to the calculated number of packets.

However, in the conventional art, all the information the MT provides to a user is merely the call time (or the connection time) as information for the billing amount estimation or on the service use amount. This makes the user totally dependent on the information of the communication provider as far as concerned the billing amount of the data service.

The above references are incorporated by reference herein where appropriate for appropriate teachings of additional or alternative details, features and/or technical background.

SUMMARY OF THE INVENTION

Therefore, an object of the present invention is to provide a method for measuring a service data amount of a terminal capable of measuring an amount of provided data and providing the measured amount to a user, when a terminal equipment (TE) performs a data communication service by using a call connection networking function.

To achieve at least the above objects in whole or in parts, there is provided a method for measuring a service data amount of a terminal in a call connection networking between a TE and a network, in which a an amount of provided data is measured and displayed on a screen.

Preferably, the data is a payload of a transmission control protocol layer.

Preferably, measurement of the data amount is performed from a point when the transmission control protocol is set to a point when every protocol session of the TE is terminated.

Preferably, the terminal operates as a modem of the TE.

To achieve at least these advantages in whole or in parts, there is further provided a method for measuring a service data amount in a call connection networking between a terminal equipment (TE) and a network, including: measuring an amount of provided data when a channel for data transmission is set between the TE and the network; and displaying the measured amount of data on a screen of a terminal.

Preferably, measurement of the amount of provided data is performed by the terminal.

Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objects and advantages of the invention may be realized and attained as particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in detail with reference to the following drawings in which like reference numerals refer to like elements wherein:

Figure 1 shows information displayed on a screen of a terminal in accordance with a conventional art;

Figure 2 illustrates a call connection networking procedure using a mobile communication terminal;

Figure 3 is a flow chart of a method for measuring the number of packets in accordance with a preferred embodiment of the present invention;

Figure 4 illustrates a connection structure between a TE (Terminal Equipment) and an MT (Mobile Terminal) and a protocol stack in accordance with the preferred embodiment of the present invention; and

Figure 5 shows information displayed on a screen of a terminal in accordance with the preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 3 is a flow chart of a method for measuring the number of packets in accordance with a preferred embodiment of the present invention, showing a packet number measuring procedure performed by the MT after a channel for data transmission is set between the TE and a network.

As shown in Figure 3, the packet number measuring procedure in accordance with the present invention includes: a step (S11) in which an SIO packet is monitored to check whether there is a PPP control packet; steps (S12 and S13) in which if there is a PPP control packet, the packet is analyzed to check whether a TCP setup state of the TE 10 is 'PPP ESTABLISHED'; steps (S14~S16) in which if the TCP setup state of the TE 10 is 'PPP ESTABLISHED', all the packets transmitted and received until every protocol session of the TE is terminated or until a data cable is detached are cumulatively calculated; and steps (S17 and S18) in which when every protocol session of the TE is terminated or when the data cable is detached, the packet accumulated information is classified into transmission packet accumulated information and reception packet accumulated information and stored in a memory.

The data substantially provided to the user (referred to as 'effective packet') refers to a data excluding a data (or signal) added during a protocol stack setting process, that is, a process of setting a session of TCP/IP/PPP.

Checking the start time point and termination time point of measuring the effect packet is a crucial factor to count effective packets and calculate a statistics value.

While the call connection network is being performed, the MT can not check contents of every protocol. Thus, while monitoring packets (SIO TX/RX packets) transmitted to and received from a data communication cable, the MT 20 initiates measurement of effective packets when the TCP setup state of the TE 10 is 'PPP ESTABLISHED'.

Figure 4 illustrates a connection structure between a TE (Terminal Equipment) and an MT (Mobile Terminal) and a protocol stack in accordance with the preferred embodiment of the present invention.

The preferred embodiment of the present invention will now be described with reference to Figures 3 and 4.

When the TE 10 and the MT 20 are connected, the MT 20 monitors packets (referred to as 'SIO packets', hereinafter) transmitted to and received from the data communication cable.

When a 'PPP control packet' is found among SIO packets, the MT 20 analyzes the packet and check whether TCP setup state of the TE 10 is 'PPP ESTABLISHED'.

If the TCP setup state of the TE 10 is 'PPP ESTABLISHED', the MT 20 sets an 'enable' value as a state value indicating a start point of effective packet measurement. And then, the MT 20 performs an effective packet separation to extract a user data from effective packets.

The effective packet separation is performed through a procedure defined at protocols of each layer. That is, the MT 20 separates a header and a tailer generated at a PPP layer and a TCP/IP layer to extract a user data.

First, the MT 20 obtains information on setup of PPP session between the TE 10 and a network through a generally performed PPP unframed, and then,

checks a TCP/IP header compression information in order to use it as control information when extracting TCP/IP header information.

Thereafter, the MT 20 separates a TCP/IP packet, a payload of the PPP layer and then separates the header and the tailer of the IP layer and the TCP layer, thereby extracting a user data.

As the user data is extracted, the MT 20 calculates how many packets the size of the extracted data corresponds to. In this respect, before the calculation, the packet size should be defined first. The number of bytes corresponding to 1 packet may differ a bit by service providers. For example, if 1 packet is 512 byte, a value obtained by dividing a user data by 512 is the number of provided packets.

While the state variable is set 'enable', the MT 20 classifies the transmission and reception packets of the TE 10 into the number of transmitted packets and the number of received packets to separately, cumulatively calculate them, and then outputs the packet accumulation information on the screen. The packet accumulation information outputted on the screen is updated periodically according to the provider's request.

When a specific user, who has occupied a channel, does not transmit or receive data temporarily, the networking system hands over authorization on the channel to a different user. This is called a dormant function.

While the MT 20 is dormant, the state variable is set to 'disable' and the packet accumulative calculation operation of the MT 20 is temporarily suspended. Therefore, the packet accumulative calculation operation of the MT 20 is not terminated until every protocol session of the TE 10 is terminated (PPP RELEASED) or connection of the data cable is detached. The counted cumulative

information of the transmitted and received packets is stored in a non-volatile memory of the MT 20.

When the accumulative information on the number of transmitted and received packets is initialized, the next updated accumulative information on the number of packets is stored in the non-volatile memory of the MT 20 by discriminating transmitted packets, received packets and the total packets. Then, the user can check various packet accumulative information by a search function through a user interface.

In addition, the user can delete or initialize the stored packet accumulative information through the user interface function, and in this case, deletion and initialization are performed by discriminating a transmitted packet and a received packet.

Figure 5 shows information displayed on a screen of a terminal in accordance with the preferred embodiment of the present invention.

As shown in Figure 5, the mobile communication terminal outputs the accumulation information on the amount of transmitted packets and the amount of received packets and a connection time on its screen.

As so far described, the method for measuring a service data amount of a terminal has the following advantage.

That is, because the information on the amount of data provided for service is provided to a data service user, the user can estimate a corresponding billing amount, and thus, the data service can be more effectively used in terms of cost.

The foregoing embodiments and advantages are merely exemplary and are not to be construed as limiting the present invention. The present teaching can

be readily applied to other types of apparatuses. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art. In the claims, means-plus-function clauses are intended to cover the structure described herein as performing the recited function and not only structural equivalents but also equivalent structures.